Fast Tests for Campylobacter

Two high-tech tactics may speed identification of *Campylobacter jejuni*, the microbe responsible for more cases of foodborne illness in the United States than any other bacteria. *Campylobacter* has turned up in eggs, raw milk, raw or undercooked meat and poultry, raw oysters, and contaminated water.

C. jejuni sickens an estimated 4 million Americans every year. Of those, some 200 to 1,000 cases are fatal, according to the U.S. Centers for Disease Control.

At the ARS Western Regional Research Center in Albany, California, scientists have produced two new molecular probes that seek out and bind to *C. jejuni*. Known as monoclonal antibodies, the probes did that job with impressive accuracy in lab tests with about 20 different varieties of bacteria.

The probes might become part of a fast, reliable assay for identifying this pathogen at the packinghouse, says microbiologist Robert E. Mandrell of the Food Safety and Health Research Unit at Albany. Or they could be packaged into a clinical assay to help healthcare professionals identify *C. jejuni* when diagnosing cases of gastroenteritis—an inflammation of the stomach and intestines.

What's more, the assay may help in identifying *C. jejuni* associated with a nervous system disorder, Guillain-Barré syndrome. *C. jejuni* is implicated in as many as 30 to 40 percent of the cases of this disease.

The probes, says Mandrell, may prove less labor intensive and time consuming than many assays currently used to identify *C. jejuni*. He developed the monoclonal antibody probes with colleagues David L. Brandon and Anne H. Bates at Albany. ARS is seeking a patent.

In related work, researcher William F. Haddon, also in the Food Safety and Health Unit, is investigating use of a cutting-edge technology known as MALDI-TOF mass spectrometry to distinguish *C. jejuni* from other *Campylobacter* species and from other microbes as well. There are about a dozen different species of *Campylobacter*. Of these, *C. jejuni* is the most dangerous to humans.

The sophisticated instrument that Haddon and co-researchers Bates, Mandrell, Leslie A. Harden, and Marian R. Wachtel use for this approach emits a laser beam to zap pathogen samples. When the beam strikes the sample, proteins break away from it.

Teamed with a computer, the instrument can determine the weight—or mass—of different proteins, measured in units known as daltons. The result: a distinctive fingerprint, or profile, of the array of proteins from the zapped sample. The profile, displayed as an easy-to-read graph generated by the computer, may reveal the identity of the microbe.

That's what happened in preliminary tests of four different *Campylobacter* species. A protein weighing 13,724 daltons, for instance, was detected from the *C. jejuni* specimen. But it didn't show up in analyses of the *C. fecalis*, *C. coli*, or *C. jejuni* subspecies *doylei.*

Key to this approach: the instrument's precision. It can calculate protein weight to within 5 daltons.

Besides precision, the technique also offers the promise of speed: once a sample is prepared for analysis, results can be ready in about 3 minutes. With further work, this technology may yield one of the fastest and easiest ways to correctly identify foodborne pathogens.—By **Marcia Wood,** ARS.

This research is part of Food Safety, an ARS National Program described on the World Wide Web at http://www.nps.ars.usda.gov/programs/108s2.htm.

Scientists named in this article are in the USDA-ARS Food Safety and Health Research Unit, Western Regional Research Center, 800 Buchanan St., Albany, CA 94710; phone (510) 559-5610, fax (510) 559-5948, e-mail oly@pw.usda.gov. ◆

BRIAN PRECHTEL (K8244-2)

Chemist Leslie Harden uses a laser-equipped mass spectrometer to measure the weights of proteins in bacteria. A computer records the weight and produces distinctive profiles that may distinguish between *Campylobacter* species.